BLACKROCK AUXILIARY POWER UNIT (APU)

User Manual

Version 5.0

YOUR BLACKROCK APU SERIAL NUMBER IS:

We attempt to make all of our manuals as clear, complete and accurate as possible. If you have any suggestions or corrections, we would welcome them. Please contact us either by phone at (775) 246-5897 or by e-mail to: apusupport@blackrockapu.com

Thank you – the BLACKROCK APU Team!

Black Rock Systems LLC • 4 Carry Way • Suite 101 • Carson City, NV 89706-7777
Phone: (775) 246-5791 • Toll Free (800) 731-5791• Fax: (775) 246-5989
E-mail: apusupport@blackrockapu.com • www.blackrockapu.com

BLACK ROCK SYSTEMS LLC

COPYRIGHT AND DISCLAIMER

This manual is intended to assist the owner of a BLACKROCK APU in using and enjoying his/her purchase. It is not intended to be a service or installation manual. Service and installation should only be done by an authorized BLACKROCK APU dealer.

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Phone: (775) 246-5791 • Toll Free (800) 731-5791 • FAX: (775) 246-5989
E-mail: apusupport@blackrockapu.com • www.blackrockapu.com

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E-mail: apusupport@blackrockapu.com • www.blackrockapu.com

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E-mail: apusupport@blackrockapu.com • www.blackrockapu.com

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1. THE BLACKROCK APU

1.1 The BLACKROCK APU is the highest performing, most reliable APU on the market today with one of the best warranties available. To keep the warranty in force, follow the recommended maintenance procedures and schedules.

1.2 We try to create manuals for our customers and dealers that are easy to read, complete, and accurate. If you have any changes or corrections to suggest, we want to hear from you. Please contact us by phone at 800-731-5791 or e-mail: apusupport@blackrockapu.com

You have just purchased the best APU on the market with the following superior features:

- Choice of 2-cylinder or 3-cylinder diesel engine
- Choice of generator size
- Best A/C and heating output in the industry
- Best-in-class oil change interval
- Stand-alone design with no interface to main engine, which eliminates truck OEM warranty concerns
- Truck engine failure won't disable APU
- APU failure won't disable the truck
- Smart Power Management
  - APU load balancing between HVAC and electricity generation that directs the power where you need it most
- HVAC temperature control and blower speeds
- Full Instrumentation guards against damage due to:
  - High coolant temperature
  - Engine over/under speed
  - Overload
  - Alternator fail to charge
  - Generator and belt failure detection
- Coolant temperature gauge (optional)

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2. SPECIFICATIONS

YANMAR 2-Cylinder / 3-Cylinder US EPA Tier II Compliant Diesel Engines

Dimensions:	W x H x D 29.5 in (75 cm) 28.5 in (72 cm) 30 in (76 cm)
Engine:	Customer Option: 2-cylinder or 3- cylinder engine
Weight:	2 Cylinder: 425 lbs/193 kg, plus 35 lb/16kg HVAC unit
	3 Cylinder: 480 lbs/218 kg, plus 35 lb/16kg HVAC unit
Fuel Consumption:	2 Cylinder: 0.2 gal/hr (0.76 l/hr)
	3 Cylinder: 0.3 gal/hr (1.14 l/hr)
AC Power Output:	Customer Option: 3.7 to 6kW generator
Operating Temperature Range:	0º F/-32º C to 120º F/50º C
Noise Level:	Meets National Park Standard (36 CFR2.12) 60 DB at the A-WEIGHTED scale @ 50 Feet
DC Power:	55 amps
Heating Main Engine:	120 volt AC to power a Block Heater
Oil Change Interval:	1000 hours
Environmental:	EPA Tier II and EU compliant
Available Options:	Removable Steps
	Ultra Cold Weather Package
BLACKROCK'S Heating, Ventilation and Air Conditioning (HVAC)Unit	
Dimensions:	W x H x D 17 in (43 cm) 10 in (25.4 cm) 18 in (46 cm)
Weight:	30 lbs (13.6kg)
Air Conditioning:	26,000 BTU/hr
Heating:	26,000 BTU/hr
Air Flow:	405 cfm (11.5cmm)
Refrigerant:	R-134A
Warranty:	2 years or 4,000 hours

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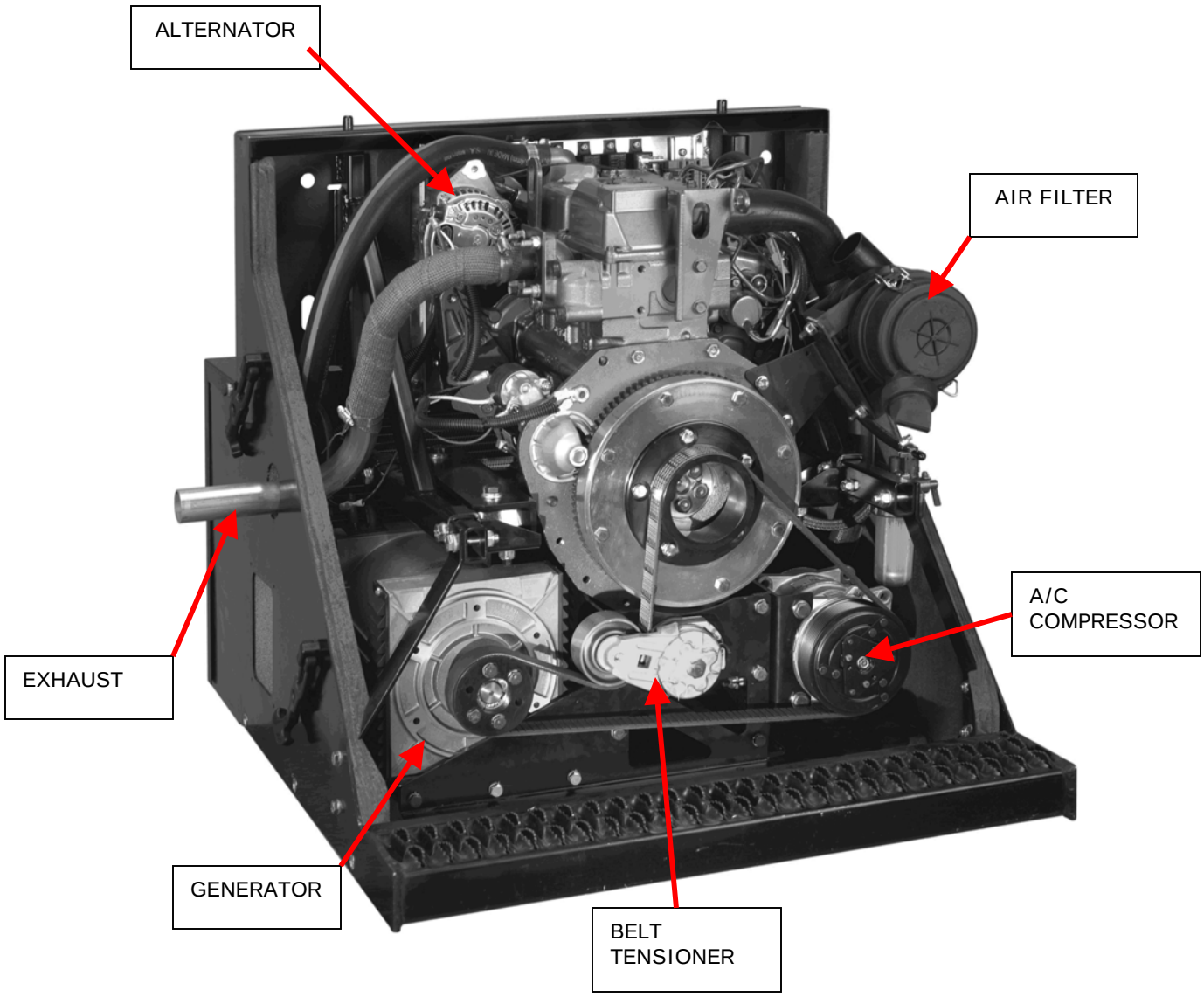

DIAGRAM 1: BLACKROCK APU INTERNAL VIEW
MODEL Y360 USING A YANMAR ENGINE (rev. 2)

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3. CUSTOMER SERVICE and SALES & MARKETING INFORMATION

CUSTOMER SERVICE

Maria Mueller
Vice President, Operations
Black Rock Systems LLC
4 Carry Way, Suite 101
Carson City, NV 89706-7777

800-731-5791
775-246-5897
FAX: 775-246-5989
E-mail: apusupport@blackrockapu.com

US SALES & MARKETING

Steve Rovarino
Vice President, Sales & Marketing
Black Rock Systems LLC
18124 Wedge Parkway, Suite 436
Reno, NV 89511-8134

800-731-5791
775-246-5897
FAX: 775-246-5989
E-mail: rovarino@blackrockapu.com

European Union SALES & MARKETING

Willie Burke
Vice President, Sales & Marketing
Black Rock Systems LLC
Hibernian House
Portumna CO. GALWAY
IRELAND

+353-9097-41163
E-mail: europesales@blackrockapu.com

4. SAFETY INFORMATION

California ***Proposition 65*** Warning: Diesel engine exhaust and some of its constituents are known to cause cancer, birth defects and other reproductive harm. Black Rock Systems LLC encourages all individuals who work with the BLACKROCK Auxiliary Power Unit (APU) to:

4.1 Read the BLACKROCK APU User Manual carefully and completely before using the APU. If you have questions on any of the items explained in the manual, please contact us at 800-731-5791 before attempting to use the BLACKROCK APU.

4.2 Follow the stated procedures set forth in this Manual.

4.3 Wear protective safety equipment and clothing when working with the BLACKROCK APU.

4.4 Do not operate the APU with its cover off, or with any obstructions.

4.5 Always disconnect the main battery cables on the truck before connecting the APU to the truck's interface.

4.6 Allow only qualified and trained personnel to work on the BLACKROCK APU.

4.7 Take appropriate precautions when handling fuel, coolant and oil.

4.8 Do not ingest any such fluids, and avoid contact with skin and eyes.

4.9 Dispose of materials in accordance with all applicable laws.

4.10 Inspect hoses and connections frequently for signs of leakage or damage, since the BLACKROCK APU contains hot oil and coolant under pressure.

4.11 Do not leave children and animals unattended in a truck even with the APU running.

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5. WARNING LABELS

5.1 Observe all labeled warnings. Do not remove warning labels.

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6. FLUIDS

6.1 Follow the APU engine manufacturer's instructions for handling and disposing of the engine's coolant and oil.

6.2 Follow the instructions provided by the truck manufacturer regarding handling and disposing of air conditioning refrigerant.

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7. ENGINE COOLANT

7.1 The APU uses the same coolant type as the truck. Normally this is low-silicate permanent antifreeze 50% by volume for temperatures down to -32° F/-35.6C.

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8. WARRANTY PROGRAM

8.1 Subject to all terms and conditions contained herein, Black Rock Systems LLC (Black Rock) warrants to the original buyer that under normal service and use the BLACKROCK APU will be free from defects in material and workmanship for **two (2) years or four thousand (4,000)** hours of operation, whichever comes first, from the date of original installation on a truck by a Black Rock authorized dealer (Dealer).

8.2 The YANMAR engine has a limited warranty: **three (3) years or four thousand (4,000) hours**. The first two (2) years or 2,000 hours of operation, whichever comes first, are warranted on all YANMAR engine components. During the 3rd year, or from 2,001 to 4,000 hours of operation, only major components are covered under warranty.

Black Rock will repair or replace, at its discretion, any part covered by this warranty that becomes defective, malfunctions or otherwise fails to conform to this warranty under normal use and during the term of this warranty, at no charge for parts or labor. Repair or replacement will be performed at any Dealer, upon presentation of proof of purchase and determination by Black Rock and its Dealer that a component is defective or has failed under normal service and use. Repair and replacement of components under this warranty shall not extend the warranty period for the APU or for any component of the APU.

8.3 **Disclaimer of Other Warranties**

8.3.1 Black Rock, **INCLUDING ITS AGENTS AND DEALERS, MAKES NO OTHER WARRANTIES, AND EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE**. No person, firm, or representative is authorized to assume any obligation or make any warranty on behalf of Black Rock other than the limited warranty as stated herein.

8.3.2 This warranty is extended under the laws of the State of Nevada. Enforcement of this warranty shall be conducted according to the laws of the State of Nevada. By acceptance of this warranty, the owner of the APU agrees that any litigation and the resolution of any dispute between Black Rock and the owner of the APU shall be conducted exclusively in courts of the State of Nevada.

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8.4 Maintenance

8.4.1 The BLACKROCK APU Owner's Manual lists all maintenance functions required to validate this limited warranty. **PLEASE NOTE THAT COMPONENTS WHICH FAIL DUE TO POOR OR IMPROPER MAINTENANCE WILL NOT BE COVERED BY THIS LIMITED WARRANTY**. As a condition of this warranty, Black Rock reserves the right to request proof, in the form of receipts for maintenance and any other records, that service on the APU has been carried out as per the maintenance set forth in this User Manual.

8.5 Installation

8.5.1 In order to validate the BLACKROCK APU warranty, a Black Rock Dealer must install the unit. Black Rock is not responsible for components that fail as a result of improper installation.

8.6 Warranty Expectations -

This limited warranty does not apply to:

8.6.1 Defects, malfunctions, or failures resulting from accidents, abuse, modifications, alteration, improper servicing, contamination, road hazards, or failure to perform required service.

8.6.2 Normal maintenance services or parts associated with such services, including but not limited to filters, filter elements, oils, lubricants, coolant, refrigerant, belts, fuses, and glow plugs.

8.6.3 Non-approved parts.

8.6.4 Used parts.

8.6.5 Any damage caused by overheating the APU that is not a direct result of a defect in APU materials or workmanship.

8.6.6 Damage caused to the host truck, whether or not such damage is related in any way to the presence of the BLACKROCK APU on the truck.

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8.7 Warranty Claims

8.7.1 In order to obtain warranty repairs, the owner will need to provide verification of proof of purchase with the APU serial number to a Dealer. The names and addresses of Dealers are listed at www.blackrockapu.com, or the owner may contact Black Rock directly to obtain the information.

8.7.2 The Dealer handling the warranty claim must call Black Rock for authorization of all warranty work, and may rely on Black Rock's written authorization, which must include the authorized number of labor hours for the warranty repair. Black Rock will deal with all component vendors, so the Dealer does not have to do so, though Black Rock may request that defective parts under warranty be shipped from the Dealer to the original manufacturer on behalf of Black Rock.

8.8 Claim Reimbursement

8.8.1 Labor rate recovery is based on the Dealer's standard service rate, which must be a published and verifiable rate, multiplied by no more than Black Rock authorized number of labor hours.

8.8.2 Parts reimbursement is based on the Dealer's cost plus 20%. All warranty reimbursement claims by Dealers must be submitted within one month of performance of the warranty work.

8.8.3 Parts replaced under this warranty must be retained for 90 days for inspection, and be sent to Black Rock if so requested. Return Material Authorization (RMA) numbers are required for all returned parts. Replaced warranty parts are covered for three (3) months, or the remainder of the original warranty period, whichever is longer.

8.8.4 All other express or implied warranties, including, without limitation, those arising under the laws of equity and the implied warranties of merchantability and fitness for a particular purpose, are hereby expressly excluded from the sale and purchase of the APU and related apparatus sold hereunder, regardless of whether a claim arises under contract or tort principles, or on any other basis.

8.8.5 The buyer's sole remedy hereunder shall be limited to the repair or replacement of any nonconforming equipment or parts, but only if returned to a Dealer within the warranty period defined above, or with the express written approval of

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Black Rock management. Black Rock's liability on any and all claims for damage or loss related to the delivery, installation and use of the APU shall not exceed the original installed price of the APU. **IN NO EVENT WILL BLACK ROCK BE LIABLE FOR: LOSS OF USE; LOSS OF PROFITS; LOSS OF, OR DAMAGE TO, SHIPPED GOODS; INCONVENIENCE; COMMERCIAL LOSS; OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

8.9 Transfer of Warranty

8.9.1 This warranty shall be for the benefit of the initial purchaser. If a truck upon which the APU is installed is sold and the unit is not removed, the new owner may request in writing that Black Rock transfer the remainder of the original warranty. Such a request shall note the hours accumulated by the APU at the time of ownership transfer, as well as the initial date of installation.

8.9.2 If the APU is being removed and installed onto a different truck, then a Dealer must perform the installation, and the warranty transfer must be requested in writing as described above.

8.9.2 Upon approval by Black Rock, the new owner will be covered for the remaining warranty left on the APU. Black Rock reserves the right to deny transfer of warranty if these conditions are not met.

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9. SERVICE INTERVALS FOR YANMAR ENGINES

System	Check Item	Daily	Every 50 Hours	Every 250 Hours	Every 500 Hours	Every 1000 Hours	Every 2000 Hours
Fuel	Drain Water Separator		X				
	Clean Water Separator				X		
	Replace Fuel Filter				X		
Engine Oil	Check Engine Oil Level	X					
	Engine Oil Replacement		1st time			2nd and after	
	Engine Oil Filter Replacement						
Radiator fins/fans	Check for functionality	X					
Coolant	Check & Addition of Coolant	X					
	Coolant Replacement					X or 1 year	
	Coolant Water Path Flushing and Maintenance						Contact Dealer
Rubber Hoses	Fuel and Water Hose Replacement						X or 2 years
Intake & Exhaust	Air Cleaner Element Cleaning			X			
	Air Cleaner Element Replacement				X		
Cylinder Head	Adjust Intake/Exhaust Valve Clearance					Contact Dealer	
	Lapping Intake/Exhaust Valve Seats						Contact Dealer
Fuel, Valve, Pump*	Check Fuel Injection Valve Pressure and Adjust					Contact Dealer	
	Check & Adjust Fuel Injection Pump						Contact Dealer
*The specific emissions related parts for EPA/ARB regulations.							

Oil Change: First oil change after 50 hours. **No synthetic oil may be used during the first 50 hours of operation.** CF, CF-4 and CG-4 class oils may be used.

Oil Filter Change: First filter change after 50 hours, change oil and filter every 1,000 hours thereafter.

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10. SERVICE INTERVALS FOR KUBOTA ENGINES

System	Check Item	Daily	Every 50 Hours	Every 100 Hours	Every 200 Hours	Every 400 Hours	Every 1000 Hours
Fuel	Drain Water Separator		X				
	Clean Water Separator				X		
	Replace Fuel Filter				X		
Engine Oil	Check Engine Oil Level	X					
	Engine Oil Replacement		1st time	2nd and after			
	Engine Oil Filter Replacement						
Belts	Check Drive Belt Tightness	X					
	Check Alternator Belt Tightness	X					
Radiator fins/fans	Check for functionality	X					
Coolant	Check & Addition of Coolant	X					
	Coolant Replacement					X or 1 year	
	Coolant Water Path Flushing and Maintenance						X or 2 years
Rubber Hoses	Fuel and Water Hose Replacement						X or 2 years
Intake & Exhaust	Air Cleaner Element Cleaning			X			
	Air Cleaner Element Replacement				X	X	
Cylinder Head	Adjust Intake/Exhaust Valve Clearance						X or 2 years
	Lapping Intake/Exhaust Valve Seats						X or 2 years
Fuel, Valve, Pump*	Check Fuel Injection Valve Pressure and Adjust						X or 2 years
	Check & Adjust Fuel Injection Pump						X or 2 years
*The specific emissions related parts for EPA/ARB regulations.							

Oil Change: First Oil and Filter Change after 50 hours. Change oil and filter every 100 hours thereafter. **No synthetic oil may be used during the first 50 hours of operation**. CF, CF-4 and CG-4 class oils may be used.

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11. APU OIL AND OIL FILTER CHANGE

TOOLS REQUIRED:
- Ratchet Handle
- Ratchet Extension
- Strap Wrench for Ratchet
- 17mm Wrench
- Alternative - (2) 13mm wrenches and Strap Wrench

11.1 Black Rock recommends using a strap wrench that is attached to a ratchet handle with an extension when removing the oil filter.

11.2 If a strap wrench is unavailable, use (2) 13mm wrenches as an alternative.

CAUTION! Turn off the BLACKROCK APU before working on the unit. If draining hot oil, use appropriate protection for hands and face.

11.3 Remove the lower APU Splash Shield from the bottom of the APU. This is the bottom cover.

11.4 Remove the Drain Plug on the bottom of the APU's Oil Pan using a 17mm wrench to unscrew it.

11.5 Drain all of the oil from the APU's Oil Pan into an appropriate container and recycle appropriately.

11.6 Replace the Oil Drain Plug in the bottom of the Oil Pan after all the oil has been drained from the Pan.

CAUTION FOR KUBOTA ENGINE! During the removal of the Kubota filter, do not touch the terminals of the Starter or Alternator.

11.7 Wait for the engine to cool before replacing the Oil Filter.

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11.8 Remove the old Oil Filter using a strap wrench that can be used with a ratchet and an extension.

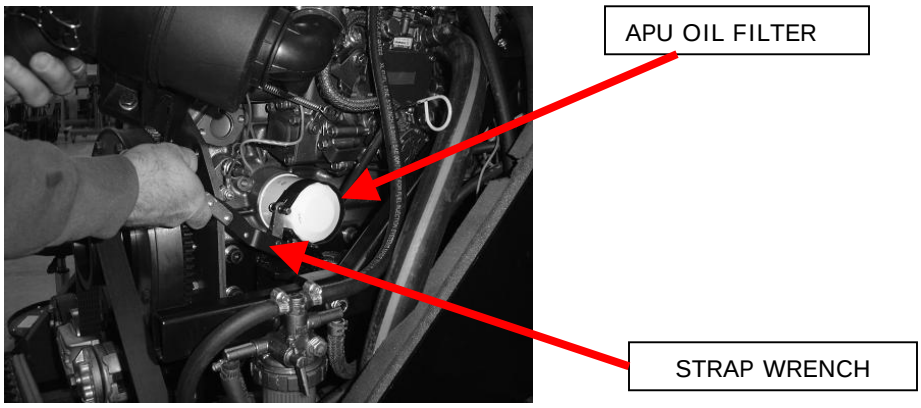

DIAGRAM 2: REMOVING OIL FILTER

ATTENTION! If a strap wrench is unavailable, remove the Air Filter Bracket using (2) 13mm wrenches and socket so that an oil filter wrench can be fitted onto the Oil Filter.

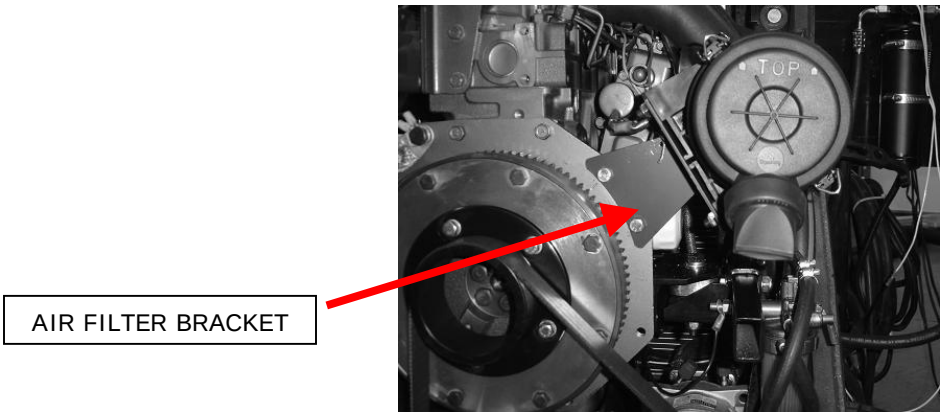

DIAGRAM 3: AIR FILTER BRACKET

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11.9 Replace the Oil Filter with Black Rock Oil Filter:

YANMAR Black Rock P/N109-0002 both 2 and 3 cylinder (YANMAR P/N 119305-35150)

KUBOTA Black Rock P/N109-0001 both 2 and 3 cylinder (Kubota P/N 70000-15241)

11.10 If removed, reattach the Air Filter Bracket.

11.10 Refill the Engine with 15W-40 oil.

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12. YANMAR AND KUBOTA ENGINE OIL CAPACITIES

ENGINE	OIL CAPACITY
YANMAR 2TNV-70-ASA/2-cylinder engine	0.42 gal/1.58L
YANMAR 3TNV-70-KBR/3-cylinder engine	0.74 gal/2.8L
Kubota Z482 2 cylinder engine	0.66 gal/2.49L
Kubota D722 3 cylinder engine	1.0 gal/3.78L

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13. APU AIR FILTER CHANGE

PARTS REQUIRED:
- Air Filter, Black Rock P/N 109-0006

13.1 Unlatch the APU Air Filter and remove the Cover.

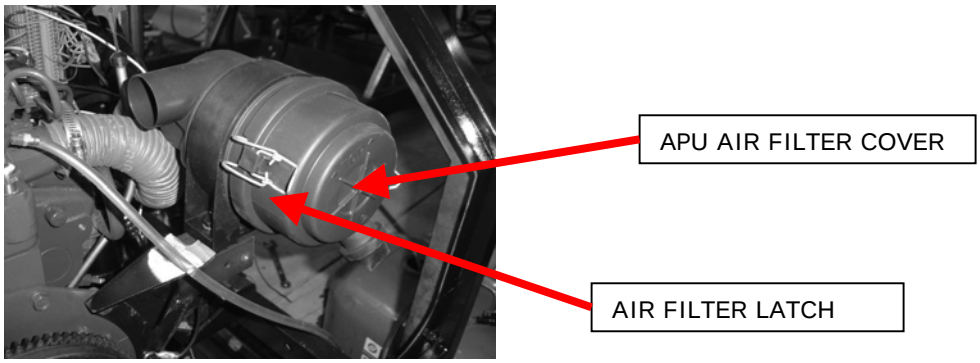

DIAGRAM 4: APU AIR FILTER COVER WITH LATCH

13.2 Pull out the Air Filter.

13.3 Replace the Air Filter with Black Rock P/N 109-0006 (Manufacturer's P/N: Enginaire P/N 2S-E1).

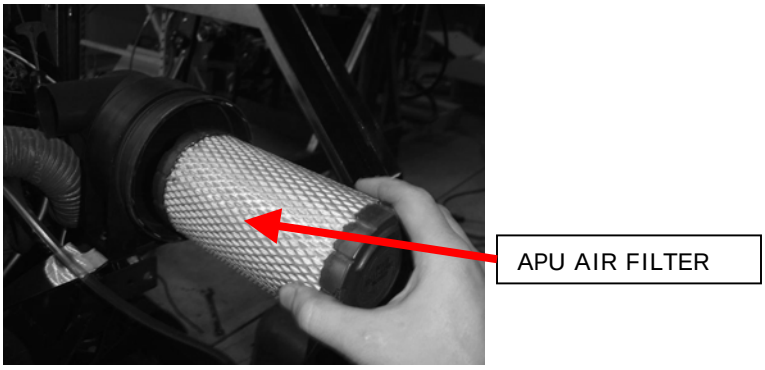

DIAGRAM 5: REMOVING AIR FILTER

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14. APU FUEL FILTER CHANGE

PARTS REQUIRED:
- YANMAR – Black Rock P/N 109-0007 Fuel Filter, YANMAR P/N 119810-55650
- Kubota – Black Rock P/N 109-0008 Fuel Filter, Kubota P/N 15231-43560

TOOLS REQUIRED:
- Channel Lock Pliers

14.1 Close the valve on the APU Fuel Filter.

14.2 Unscrew the Fuel Filter Collar.

14.3 Remove the Fuel Filter Element

14.4 Replace the Fuel Filter Element with:

14.4.1 **YANMAR** - P/N 119810-55650 or Black Rock P/N 109-0007

14.4.2 **Kubota** - P/N 15231-43560 or Black Rock P/N 109-0008

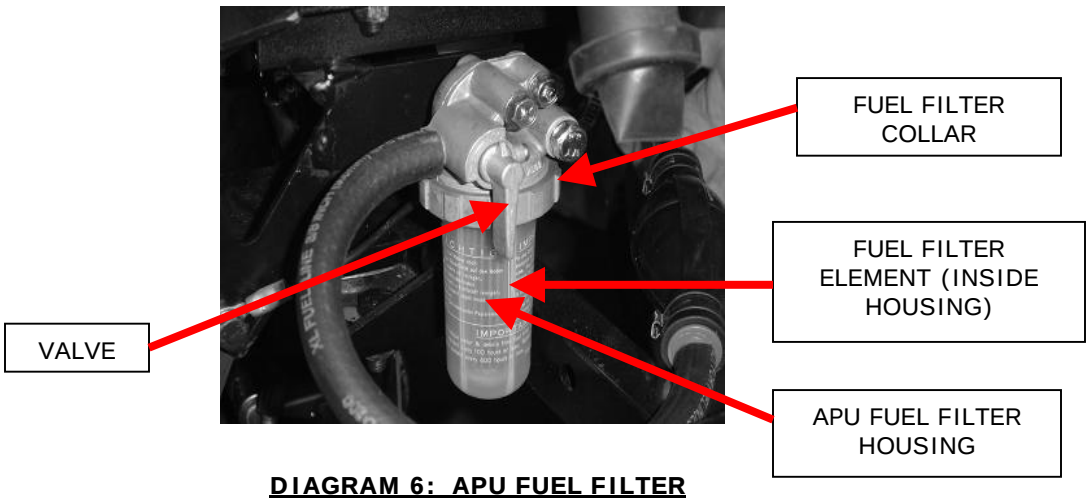

DIAGRAM 6: APU FUEL FILTER

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15. FUEL / WATER SEPARATOR

PARTS REQUIRED:
- **YANMAR ONLY** – P/N 109-0009 Water Separator Screen

TOOLS REQUIRED:
- Channel Lock Pliers

15.1 Close the valve on the APU Water Separator.

15.2 Unscrew the Water Separator Collar.

15.3 Remove the Water Separator Screen.

15.4 Wash the Water Separator Screen under running water and reinstall.

15.5 If the Water Separator Screen needs to be replaced, use:

YANMAR P/N 17108-55910 or Black Rock P/N 109-0009.

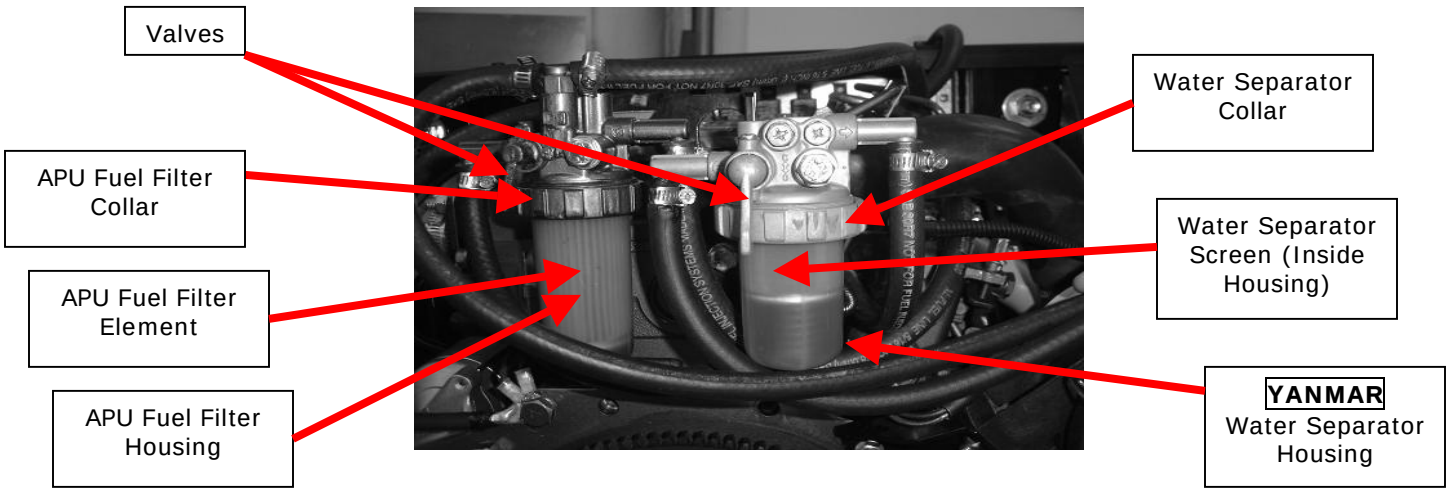

DIAGRAM 7: YANMAR WATER SEPARATOR

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16. CHANGING THE APU DRIVE BELT

PARTS REQUIRED:		
ENGINE TYPE	**BLACK ROCK BELT P/N**	**NAPA Belt P/N**
YANMAR 2TNV or 3TNV	104-0016	25-080570
Kubota Z482	104-0022	25-080550
Kubota D722	104-0021	25-080537

TOOLS REQUIRED:
- 1/2" Ratchet

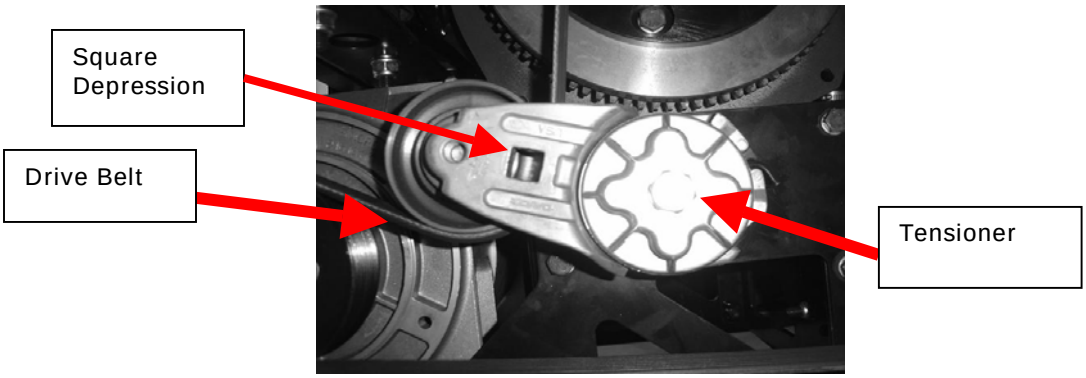

DIAGRAM 8: TENSIONER

16.1 Turn off the APU.

16.2 Turn off the Main Power Switch.

16.3 Change Drive Belt when:

16.3.1 Excessive cracking (1 per 1/2") has occurred.

16.3.2 Wear is evident.

16.3.3 Tensioner is less than 1/2" inch from the full travel position.

16.4 Insert 1/2" ratchet into the square depression in the Belt Tensioner.

16.5 Pull upward on the ratchet handle to loosen the belt.

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16.6 Remove the belt from the Pulleys.

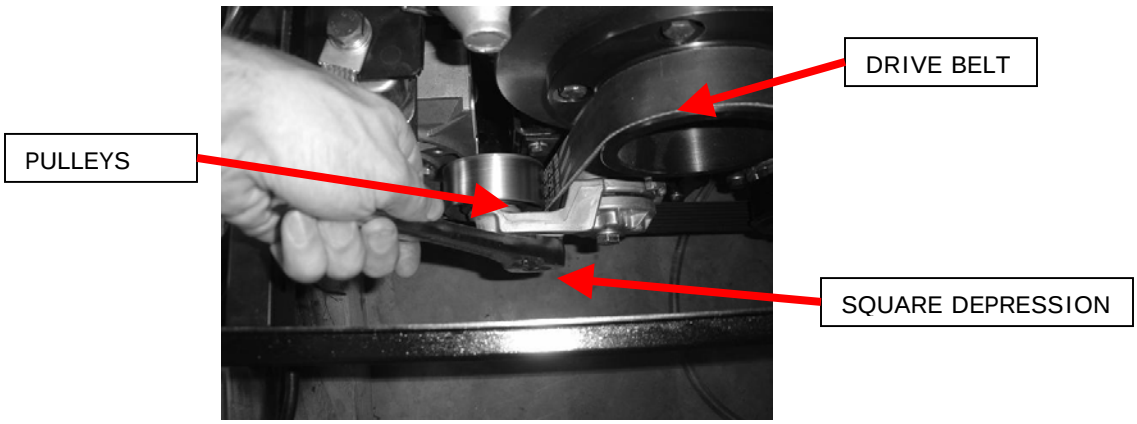

DIAGRAM 9: REMOVING DRIVE BELT

16.7 Replace the new Drive Belt by wrapping it around the pulleys as shown below using the ratchet to pull the Tensioner up so Drive Belt is installed around it.

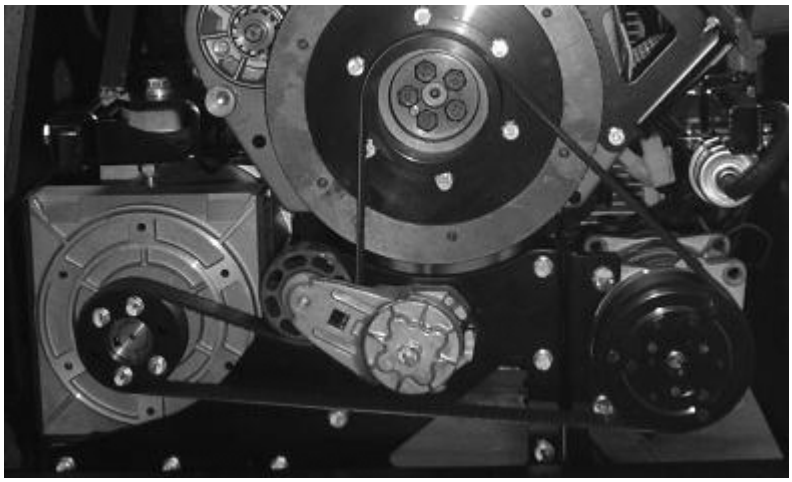

DIAGRAM 10: BELT PATH

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17. ADJUSTING APU ALTERNATOR BELT

PARTS REQUIRED:

ENGINE TYPE	MANUFACTURER PART NUMBER	BLACK ROCK BELT PART NUMBER
YANMAR	YANMAR P/N 25152-00360	109-0010
Kubota	Kubota P/N 15881-97010	109-0005

TOOLS REQUIRED:
- 12mm Wrench
- 13mm Wrench

17.1 TURN OFF the APU and TURN OFF the Main Power Switch.

17.2 APPLY MODERATE THUMB PRESSURE to the Alternator Belt at the midpoint below the Alternator. The Belt should deflect approximately 5/16" (7mm to 9mm). If Belt tension is incorrect, proceed with the below steps.

17.3 LOOSEN the Alternator Mounting Bolts.

17.4 Using a lever between the Alternator and the Engine Block, push the Alternator Belt out until Belt deflection is within acceptable limits.

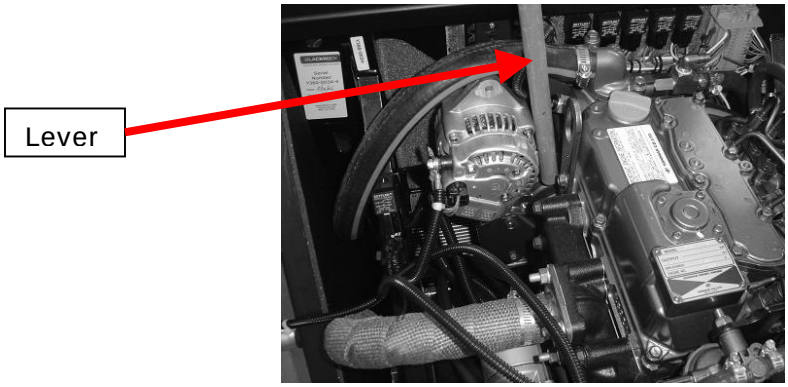

DIAGRAM 11: TIGHTENING ALTERNATOR BELT WITH LEVER

17.5 REPLACE Belt if damaged.

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18. ADDING COOLANT TO APU

PARTS REQUIRED:
- Coolant

CAUTION! Removing Coolant Pressure Cap while engine is hot can result in personal injury.

18.1 With the Main Power Switch of the APU in the “ON” position, turn the Temperature Control Knob on the Control Console clockwise until it stops.

18.2 Turn APU’s Main Power Switch to “OFF” and let the APU cool.

18.3 Remove Coolant Pressure Cap from the APU Coolant Tank.

18.4 Add coolant (50% anti-freeze and 50% water mix) until the level of the coolant just reaches the bottom of the tube that extends into the tank.

18.5 Replace Pressure Cap.

18.6 Bleed air from the system at the outlet of the engine thermostat if necessary.

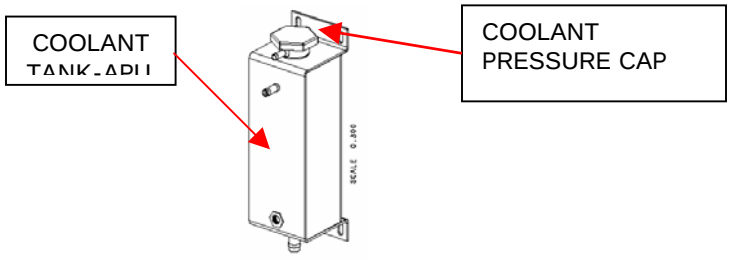

DIAGRAM 12: APU COOLANT TANK

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19. BLACKROCK APU CONTROL CONSOLE

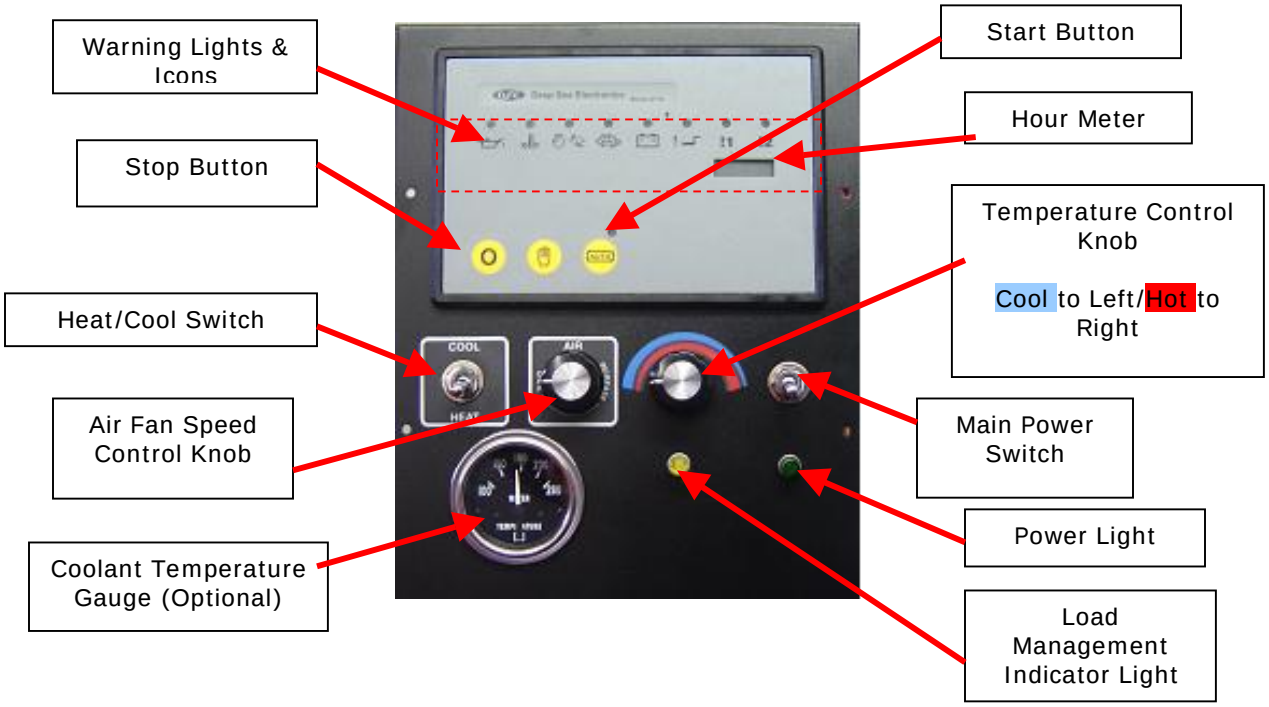

DIAGRAM 13: AUXILIARY POWER UNIT CONTROL CONSOLE

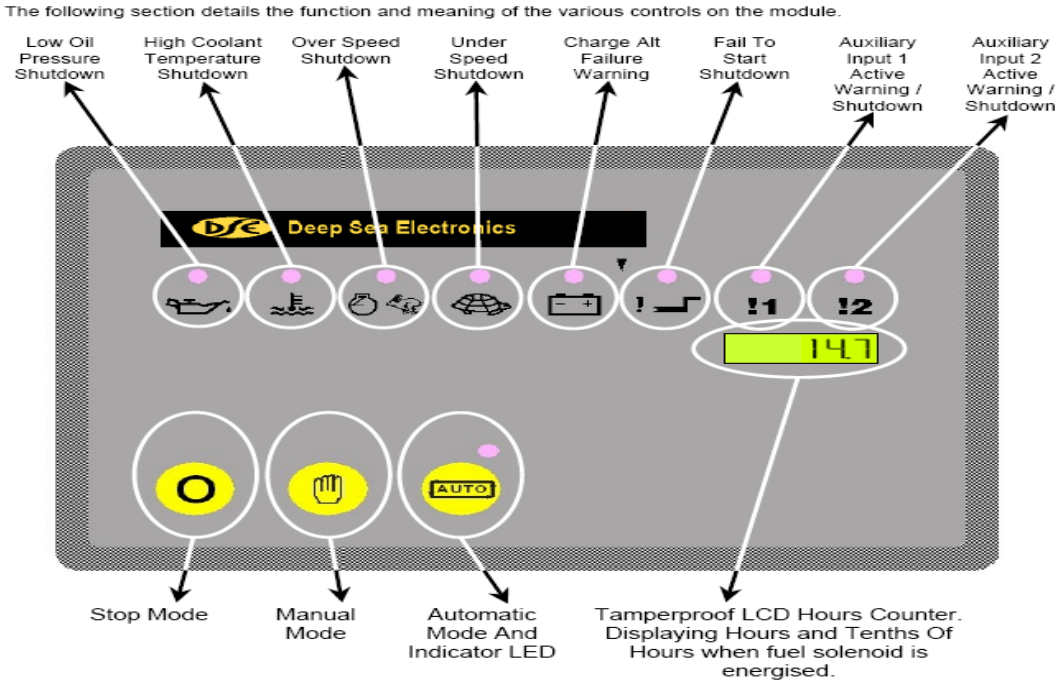
The following section details the function and meaning of the various controls on the module.
Low Oil Pressure Shutdown
High Coolant Temperature Shutdown
Over Speed Shutdown
Under Speed Shutdown
Charge Alt Failure Warning
Fail To Start Shutdown
Auxiliary Input 1 Active Warning / Shutdown
Auxiliary Input 2 Active Warning / Shutdown
Deep Sea Electronics
!1
!2
147
AUTO
Stop Mode
Manual Mode
Automatic Mode And Indicator LED
Tamperproof LCD Hours Counter. Displaying Hours and Tenths Of Hours when fuel solenoid is energised.

DIAGRAM 14: CLOSEUP OF CONTROL CONSOLE ICONS

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20. OPERATING THE BLACKROCK APU

20.1 **Starting the APU Using the Control Console**

20.1.1 Turn the APU MAIN POWER SWITCH to the “ON” position by flipping the switch.

20.1.2 Push and release the yellow START BUTTON. The APU will crank after a 10 second pre-heat time. If the APU fails to start, it will automatically try to restart two more times.

20.2 **Operating the Air Conditioning**

20.2.1 Flip the HEAT/COOL SWITCH on the Control Console to the “COOL” position.

20.2.2 Turn the TEMPERATURE CONTROL KNOB to the desired cool temperature. For maximum cooling, turn the knob counterclockwise until it stops.

20.2.3 Turn the AIR FAN SPEED CONTROL KNOB clockwise to the desired speed: low, medium or high.

20.3 **Operating the Heater**

20.3.1 Flip the HEAT/COOL SWITCH to the “HEAT” position.

20.3.2 Turn the TEMPERATURE CONTROL KNOB clockwise to the desired heat temperature. For maximum heating, turn the knob clockwise until it stops.

20.3.3 Turn the AIR FAN SPEED CONTROL KNOB clockwise to the desired speed: low, medium or high.

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20.4 Using the Electrical Outlets

20.4.1 Use the APU electrical outlets like any common household outlet.

20.4.2 If too much power is demanded from an outlet, a circuit breaker will trip inside the APU box.

20.4.3 If a circuit breaker trips, turn the APU "OFF" by flipping the MAIN POWER SWITCH to the "OFF" position.

20.4.4 Remove the APU's cover.

20.4.5 Locate the CIRCUIT BREAKER PANEL on the upper right-hand side of the APU. The tripped circuit breaker will be a white button, extending out from the breaker panel.

20.4.6 To reset the circuit breaker, push the white button in.

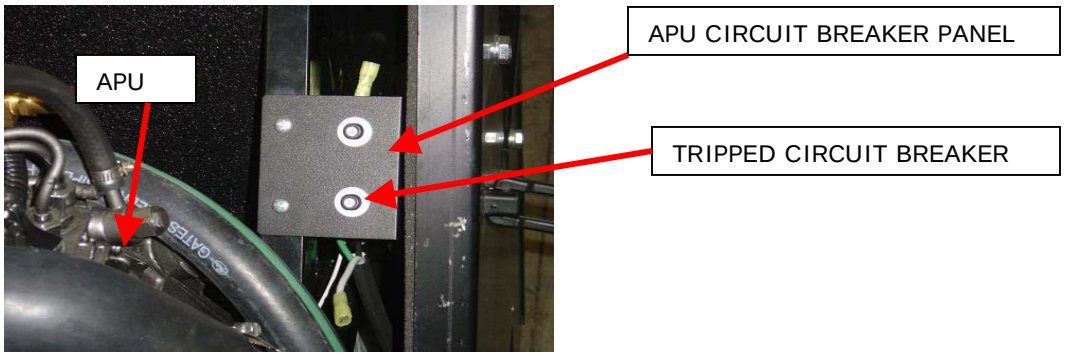

DIAGRAM 15: CIRCUIT BREAKER PANEL

CAUTION!

- If the electrical demand places a strain on the APU's engine, without tripping a circuit breaker, it is possible that the BLACKROCK APU Smart Power Management System will engage.
- The APU will monitor the load and return to normal once the load is reduced. *NOTE: During this time, air conditioning output will be reduced in order to supply the required electrical output.*

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20.5 **Using an Engine Block Heater**

20.5.1 To utilize the block heater: Plug the correct end of the block heater extension cord into the main engine's block heater receptacle and the other end into one of the APU's electrical outlets to turn the block heater on.

20.6 **Shutting Off the APU Unit**

20.6.1 Press the YELLOW STOP BUTTON. The APU engine will shut down.

20.6.2 Turn the AIR FAN SPEED CONTROL KNOB counterclockwise to the "OFF" position.

ATTENTION! Not turning off the fan will cause the battery to discharge.

20.6.3 Flip the HEAT/COOL SWITCH to the "HEAT" position.

ATTENTION! Not following the above step will cause the battery to discharge.

20.6.4 Flip the APU MAIN POWER SWTICH to the "OFF" position.

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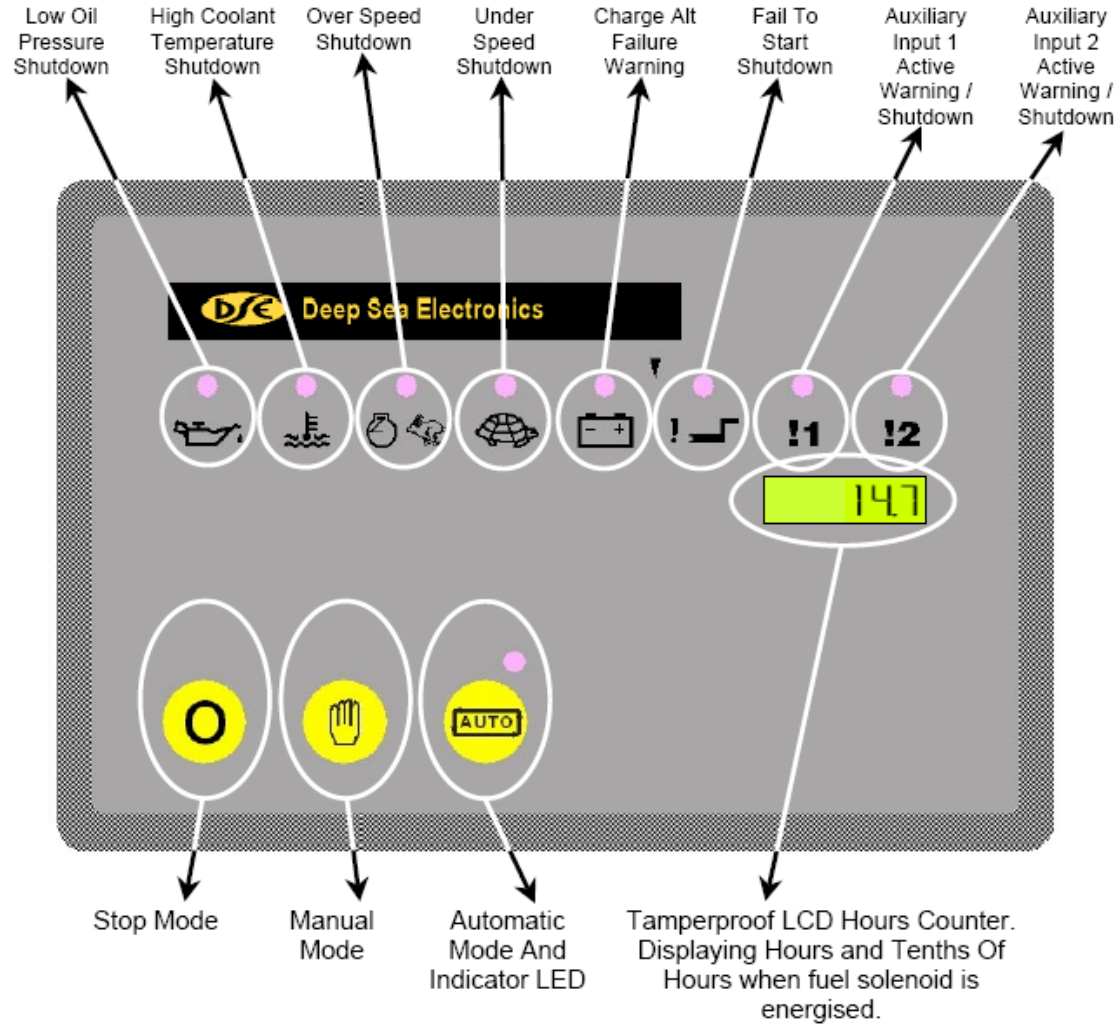
21. CONTROL CONSOLE FAILURE INDICATOR ICONS/LIGHTS

The following section details the function and meaning of the various controls on the module.



21.1 Failure Indicator Icons/Warnings

21.1.1 Warnings are used to alert the operator of an impending fault. They are either an audible alarm or a highlighted button, as shown above.

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21.2 **Battery Charge Failure**

21.1.2 If the Control Console does not detect adequate voltage from the truck's batteries, the light under the BATTERY ICON will illuminate. This means that the APU alternator is not charging the main engine's batteries adequately and either the condition needs to be corrected or the APU turned off.

21.1.3 Running the APU without the alternator functioning properly could result in a discharged main truck battery. This fault could indicate that too many 12-volt (24 volt in the EU) devices are turned on at one time.

21.3 **Shutdowns**

21.3.1 If the Control Console senses a condition that could cause damage to the APU, the electronic control unit will shut down the APU and a failure warning light will illuminate on the control console.

21.3.2 To reset the system, the alarm must be turned off. Push the yellow STOP BUTTON (O) on the Control Console to reset the module.

CAUTION! After a shutdown the fault must be cleared by pushing the STOP BUTTON (O) before the unit can be re-started.

The first detected condition that caused the shutdown will appear on the Control Panel as a steady light above the appropriate warning icon. Any additional faults that were detected after the first one will flash.

21.4 **Fail to Start**

21.4.1 When the APU's engine does not fire after the pre-set (3) attempts at starting, a shutdown will be initiated and the SHUTDOWN ICON will illuminate.

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21.5 **Low Oil Pressure**

20.5.1 If the Control Console detects that the APU's engine oil pressure has fallen below the allowed minimum, a shutdown will occur, and the LOW OIL ICON will illuminate.

21.6 **High Engine Temperature**

21.6.1 If the Control Console detects that the engine coolant temperature has exceeded the allowed maximum, a shutdown will occur and the HIGH TEMPERATURE ICON will illuminate.

21.7 **Over-Speed**

21.7.1 When the pre-set engine speed is exceeded, a shutdown will be initiated and the OVER-SPEED ICON will illuminate.

21.8 **Under-Speed**

21.8.1 When the engine speed falls below the pre-set level a shutdown is initiated, and the UNDER-SPEED ICON will illuminate.

21.9 **Lights**

21.8.1 Lights 1 and 2: CURRENTLY NOT BEING USED

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